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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/994,709      | 11/28/2001  | Ju Ming Liang        | LIAN3010/EM         | 7911             |

7590 05/26/2004

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| EXAMINER |
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ANGEBRANNDT, MARTIN J

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| ART UNIT | PAPER NUMBER |
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1756

DATE MAILED: 05/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/994,709

Applicant(s)

LIANG ET AL.

Examiner

Martin J Angebrannt

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 3/4/04 & 11/25/03.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,4,6,7,9 and 10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,4,6,7,9 and 10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

1. **The applicant's amendment of 3/4/2004 crossed in the mail with the previous office action. This office action together with the PTO-892 and any references supplied in the previous office action, replaces that office action. The period for response by the applicant is restarted with the mailing of this office action.** The response of the applicant has been read and given careful consideration. Responses to the arguments offered by the applicant are presented after the first rejection to which they are directed. Rejection of the previous office action not repeated below are withdrawn based upon the amendment to the claims and the corresponding arguments. The examiner wishes to point out that 1 nm ( $10^{-9}$ m) is equal to 10 angstroms ( $10^{-10}$  m). Some of the arguments by the applicant are aware of the order of magnitude difference, but seem to believe that 10 nm are required to form one angstrom. The amendment to the specification is approved.

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 10 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The examiner notes that when the first and second upper dielectric layers are the same material and of the same composition, it is improper to refer to them as two layers. (4/20-22). As the applicant has opened the specification up to this in the cited language, the examiner considers any upper layers in the prior art to be composites, until any claims reciting the first and second upper dielectric layers indicate that they differ in composition explicitly or implicitly by

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indicating that they differ in a physical property such as thermal conductivity **(using language from the specification).**

If the applicant would like coverage for an upper dielectric being a single layer or a bilayer, the applicant should introduce it as being either single layer or a bilayer in the independent claim.

3b Claims 4 and 10 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim 1 introduces two dielectric layers, while claim 10 reduces it to one.

**If the applicant would like coverage for an upper dielectric being a single layer or a bilayer, the applicant should introduce it as being either single layer or a bilayer in the independent claim.**

In claim 4, the upper dielectric is described as being a ZnS-SiO<sub>2</sub> composite, while in claim 1, this is specifically excluded.

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1,6,7 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura et al. '958.

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Nakamura et al. '958 teaches a polycarbonate substrate, sequentially sputtered with 80 nm ZnS-SiO<sub>2</sub> dielectric layer, a 18 nm AgInSbTeN recording film, a 32 nm ZnS-SiO<sub>2</sub> dielectric layer a 160 nm AlTi reflective layer and a 10 micron UV cured protective layer. (10/18-30 for structure and table 2 for compositions, 12/40-48). Examples using recording layers having the composition  $\text{Ag}_{1.7}\text{In}_{6.6}\text{Sb}_{66.3}\text{Te}_{23.4}\text{N}_{2.0}$ ,  $\text{Ag}_{1.5}\text{In}_{6.4}\text{Sb}_{65.2}\text{Te}_{22.9}\text{N}_{4.0}$ , or  $\text{Ag}_{1.4}\text{In}_{6.3}\text{Sb}_{64.7}\text{Te}_{22.6}\text{N}_{5.0}$  meet the claims. The use of silver, silver alloys with gold or copper and aluminum alloyed with copper appear in table 3 in column 13. The use of various materials for the upper or lower dielectric layers, including silicon nitride, aluminum nitride, ZnS, silicon dioxide, and aluminum oxide or mixtures thereof is disclosed. (8/54-65) Ag alloys with Au and Cu are taught to be especially preferred and have a better repetition of O/W times than AlTi. Silver is disclosed as having the best reflectivity (13/24-31). The thickness of the reflective layer may be up to 200 nm (4/37-38)

The examiner notes that when the first and second upper dielectric layers are the same material and of the same composition, it is improper to refer to them as two layers. (4/20-22). As the applicant has opened the specification up to this in the cited language, the examiner considers any upper layers in the prior art to be composites, until any claims reciting the first and second upper dielectric layers indicate that they differ in composition explicitly or implicitly by indicating that they differ in a physical property such as thermal conductivity **(using language from the specification)**.

It would have been obvious to one skilled in the art to modify the cited examples of Nakamura et al. '958 by using other materials for the upper dielectric layer, such as silicon nitride, aluminum nitride, ZnS, silicon dioxide or aluminum oxide in place of the ZnS-SiO<sub>2</sub> with

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a reasonable expectation of forming a useful upper protective layer based upon the disclosure of equivalent function.

Further, it would have been obvious to one skilled in the art to modify the invention of the examples cited by replacing the AlTi reflective layer with either Ag, AgCu and AgAu to gain improvements in reflectance or the number of overwrite/writer cycles the medium can go through.

The applicant is correct that now the anticipation of the claims by this reference is withdrawn. The applicant is invited to read the cited portions of the references for the teachings described by the examiner. The examiner notes that based upon the interpretation of claim 1 in light of claim 10, a single upper layer meets the requirements of the claims. The examiner reminds the applicant of the rejections under 35 USC 112 above concerning the recitations of those two claims. With respect to obviousness, the functional equivalence of the upper dielectric layers is established within the reference and the applicant bears the burden of showing otherwise. It may be that some benefit is gleaned by the applicant through the appropriate choices of the upper dielectric layer(s), but this is not on the record and the applicant does not assert any showing, further the claims are like to have to be modified to be commensurate in scope with any future showing. The disclosures of functional equivalence for the dielectric layer compositions and the reflective layer compositions assures a reasonable expectation of success as well as ample motivation.

The rejection stands.

6. Claims 1,4,6,7 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tominaga et al. JP 10-166738.

Tominaga et al. JP 10-166738 (machine translation attached) teaches a polycarbonate substrate, sequentially sputtered with 200 nm ZnS-SiO<sub>2</sub> dielectric layer (85% ZnS), a 50 nm Ag<sub>6.19</sub>In<sub>4.44</sub>Sb<sub>60.42</sub>Te<sub>27.98</sub>V<sub>0.96</sub> recording film, a 20 nm ZnS-SiO<sub>2</sub> dielectric layer (85% ZnS) a 150 nm Au reflective layer and a 5 micron UV cured protective layer. [0077-0080]. A similar medium using the recording layer of example 2, which is Ag<sub>7.48</sub>In<sub>5.52</sub>Sb<sub>61.71</sub>Te<sub>23.29</sub>V<sub>2.00</sub> [0081]. The use of various additives to the AgInSbTe recording layers are disclosed including V, Si, C, W, Ta or Ti in amounts of up to 5% [0011]. The use of Au, Ag, Pt and Cu and alloys thereof in thicknesses of up to 200 nm is disclosed [0055]. The use of other materials for the dielectric layer is disclosed including silicon nitride, aluminum nitride, ZnS, silicon dioxide or mixtures thereof. [0052]

It would have been obvious to one skilled in the art to modify the cited examples of Tominaga et al. JP 10-166738 by using other materials for the upper dielectric layer, such as silicon nitride, aluminum nitride, ZnS or silicon dioxide in place of the ZnS-SiO<sub>2</sub> with a reasonable expectation of forming a useful upper protective layer based upon the disclosure of equivalent function.

The anticipation is withdrawn, but now the rejection is applied under 35 USC 103.

7. Claims 1,4,6,7 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yuzuhara et al. JP 11-070738.

Yuzuhara et al. JP 11-070738 teaches a polycarbonate substrate, sequentially sputtered with 170 nm ZnS-SiO<sub>2</sub> dielectric layer, a 18 nm AgInSbTe recording film, a 20 nm ZnS-SiO<sub>2</sub> dielectric layer and a 100 nm AlTi reflective layer. [0019]. Table 3 shows examples 39-45 which are embraced by the claims using Zr as the additive. The use of reflective layers of Au,

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Ag, Cu, Al, ... with thicknesses of 30-250 nm is disclosed. [0016]. The use of other materials for the dielectric layer is disclosed including silicon nitride, tantalum oxide, aluminum nitride, ZnS, silicon dioxide or mixtures thereof. [0014]

It would have been obvious to one skilled in the art to modify the cited examples of Yuzuhara et al. JP 11-070738 by using other materials for the upper dielectric layer, such as silicon nitride, aluminum nitride, tantalum oxide, ZnS or silicon dioxide in place of the ZnS-SiO<sub>2</sub> with a reasonable expectation of forming a useful upper protective layer based upon the disclosure of equivalent function and further it would have been obvious to one skilled in the art to modify the invention of the examples cited by replacing the 100 nm AlTi reflective layer with a thicker layer, such as 150 nm with a reasonable expectation of achieving comparable results and to replace the AlTi reflective layer with either Ag, Al, Cu, Au or alloys thereof based upon the disclosure of equivalence.

8. Claims 1 and 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada et al. EP 1058249.

Yamada et al. EP 1058249 teaches a polycarbonate substrate, sequentially sputtered with a 90 or 100 nm ZnS-SiO<sub>2</sub> dielectric layer, a 15 or 19 nm AgInSbTe recording film, a 15 or 19 nm ZnS-SiO<sub>2</sub> dielectric layer and an 150 nm Al reflective layer and a UV cured resin protective layer. [0085 and table 1] Table 1 shows examples 7 and 8 which are embraced by the claims using N or C as the additive. The use of reflective layers of Au, Ag, Cu, Al, ... with thicknesses of 70-200 nm is disclosed. [0071]. The use of B, C, N, Si, or other group 5B elements, like P in small amounts is disclosed [0046]. The use of other materials for the dielectric layer is disclosed



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including silicon nitride, aluminum oxide, aluminum nitride, ZnS, silicon dioxide or mixtures thereof. [0014]

It would have been obvious to one skilled in the art to modify the cited examples of Yamada et al. EP 1058249 by using other materials for the upper dielectric layer, such as silicon nitride, aluminum nitride, aluminum oxide, ZnS or silicon dioxide in place of the ZnS-SiO<sub>2</sub> with a reasonable expectation of forming a useful upper protective layer based upon the disclosure of equivalent function.

Further, it would have been obvious to one skilled in the art to modify the invention of the examples cited by using a 160-200 nm thick Al reflective layer with a reasonable expectation of achieving comparable results based upon the disclosure. Further it would have been obvious to use other elements disclosed as additives in the same amounts as N or C, in their place based upon the disclosure of equivalence.

. The disclosures of functional equivalence for the dielectric layer compositions and the reflective layer compositions assures a reasonable expectation of success as well as ample motivation.

The rejection stands.

9. Claims 1,4,6,7 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over **either** Yamada et al. EP 1058249, Yuzuhara et al. JP 11-070738, Tominaga et al. JP 10-166738 **or** Nakamura et al. '958, in view of Uno et al. '690.

Uno et al. '690 teaches barrier layer placed between protective layers, such as ZnS-SiO<sub>2</sub> protective layers and phase change recording layers to prevent migration of elements into or out of the recording layer which has a deleterious effect on the medium. The use of barrier layers

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having good adhesion properties is also disclosed. The use of oxides or nitrides of Si or Al is disclosed. (6/41-57).

It would have been obvious to modify the inventions of **either** Yamada et al. EP 1058249, Yuzuhara et al. JP 11-070738, Tominaga et al. JP 10-166738 **or** Nakamura et al. '958 by adding an additional layer between the recording layer and the dielectric layer, such as oxides or nitrides of Si or Al, to prevent unwanted diffusion between the dielectric layers and the recording layer.

The examiner wishes to point out that the barrier layer prevents diffusion, not fusion. The motivation to add this layer appears in the prevention of the migration of elements into or out of the recording layer which has a deletrious effect on the medium and perhaps to increase the adhesion between the dielectric layer and the recording layer to prevent delamination between the two (see Uno et al. in the cited portions). The rejection stands.

10. Claims 1,4,6,7 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over **either** Yamada et al. EP 1058249, Yuzuhara et al. JP 11-070738, Tominaga et al. JP 10-166738 **or** Nakamura et al. '958, in view of Yoshinari et al. '399 or Kawahara et al. 669.

Yoshinari et al. '399 teach the use of a bilayer dielectric on both sides of the recording layer, where the dielectric layer closer to the reflective layer (2b) has a lower thermal conductivity than the one closer to the recording layer (2a). (12/47-67). The bilayer design is disclosed as allowing for better control over heat dissipation and prevention of peeling (6/32-43 and 1/43-2/50).

Kawahara et al. 669 teach the provision of a second or fifth dielectric layer having a higher thermal conductivity than dielectric layers on either side (first and third or fourth and sixth

respectively) (3/13-50) This is disclosed as controlling the thermal characteristics to increase the power margin and stability (2/42-49).

It would have been obvious to modify the inventions of **either** Yamada et al. EP 1058249, Yuzuhara et al. JP 11-070738, Tominaga et al. JP 10-166738 **or** Nakamura et al. '958 by adding an additional dielectric layers between the recording layer and the reflective layer or the substrate which have higher thermal conductivity to optimize the thermal properties of the recording media and prevent peeling using layers such as those as taught by Yoshinari et al. '399 or Kawahara et al. 669.

The motivation is clearly articulated by the secondary references. The rejection stands.  
11 Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Newly added thickness limitations

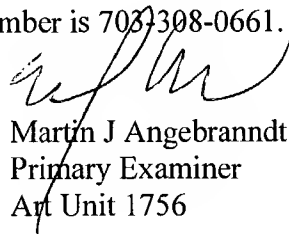
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12 Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J Angebranndt whose telephone number is 703-308-4397.

The examiner can normally be reached on Mondays-Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 703-308-2464. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.



Martin J Angebranndt  
Primary Examiner  
Art Unit 1756

May 18, 2004